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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/622,165 | 07/17/2003 | Rolf Schaller | 706634US1 | 2166 |

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| EXAMINER |
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RUTHKOSKY, MARK

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| ART UNIT | PAPER NUMBER |
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1745

DATE MAILED: 07/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

~~622~~
10/662,165

Applicant(s)

YASUMA ET AL.

Examiner

Mark Ruthkosky

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2006.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-5 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4 are rejected under 35 U.S.C. 102(e) as being anticipated by Xu (US 6,551,732.)

The instant claims are to a fuel cell system comprising a fuel cell having a housing enclosing an anode chamber, a proton exchange membrane and a cathode chamber, the cathode chamber being separated from the anode chamber by the proton exchange membrane, the housing adapted to transfer waste heat of the fuel cell; a cathode supply line coupled to a supply of compressed oxygen-containing gas and to the cathode chamber; a fuel supply coupled to the anode chamber; a cathode exhaust gas line; a heat exchanger coupled to the fuel cell for receiving waste heat of the fuel cell; and an expansion turbine, the cathode exhaust gas line fluidly connecting the cathode chamber and the expansion turbine, the heat exchanger being thermally coupled to the cathode exhaust gas line between the cathode chamber and the

expansion turbine, whereby the heat exchanger transfers heat energy from the fuel cell to cathode exhaust gas flowing through the cathode exhaust gas line.

Xu (US 6,551,732) teaches a fuel cell system comprising a fuel cell having a housing enclosing an anode chamber, a proton exchange membrane and a cathode chamber, the cathode chamber being separated from the anode chamber by the proton exchange membrane; a cathode supply line coupled to a supply of compressed oxygen-containing gas and to the cathode chamber; a fuel supply coupled to the anode chamber; a cathode exhaust gas line; a heat exchanger coupled to the fuel cell for receiving waste heat of the fuel cell; and an expansion turbine (cols. 5-6 and figure 1.) The casing inherently transfers heat to the ambient. A combustor is connected to the cathode exhaust line to exchange the combusted heat and direct the cathode exhaust to the expansion turbine. The cathode exhaust gas line fluidly connects the cathode chamber and the expansion turbine with the heat exchanger being thermally coupled to the cathode exhaust gas line between the cathode chamber and the expansion turbine. The heat exchanger transfers heat energy from the fuel cell to cathode exhaust gas flowing through the cathode exhaust gas line.

Claims 1-5 are rejected under 35 U.S.C. 102(e) as being anticipated by Cownden et al. (US 6,316,134.)

Cownden et al. (US 6,316,134) teaches a fuel cell system comprising a fuel cell having a housing enclosing an anode chamber, a proton exchange membrane and a cathode chamber, the cathode chamber being separated from the anode chamber by the proton exchange membrane, the housing adapted to transfer waste heat of the fuel cell; a cathode supply line coupled to a supply of compressed oxygen-containing gas and to the cathode chamber; a fuel supply coupled

to the anode chamber; a cathode exhaust gas line; a heat exchanger coupled to the fuel cell for receiving waste heat of the fuel cell; and an expansion turbine, the cathode exhaust gas line fluidly connecting the cathode chamber and the expansion turbine, the heat exchanger being thermally coupled to the cathode exhaust gas line between the cathode chamber and the expansion turbine, whereby the heat exchanger transfers heat energy from the fuel cell to cathode exhaust gas flowing through the cathode exhaust gas line (claims, col. 17, line 45 to col. 18, line 55.) The cathode exhaust stream is advantageously used as a heat transfer fluid to assist in the thermal management of a fuel cell. Water in the cathode exhaust is condensed at low temperature and is removed through a water separator. The water is use to for reforming fuel and heat exchange. The cathode exhaust is used in an expansion turbine (col. 17, lines 45-end.) Thus, the claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Xu (US 6,551,732) in view of Cownden et al. (US 6,316,134.)

The teachings of Xu (US 6,551,732) have been presented. The Xu (US 6,551,732) reference does not teach a cathode exhaust cooler and water separator connected between the cathode chamber and the heat exchanger. Cownden et al. (US 6,316,134,) however, teaches a

PEM fuel cell with an anode chamber, a cathode chamber and a polymer electrolyte (claims, col. 17, line 45 to col. 18, line 55.) The cathode exhaust stream is advantageously used as a heat transfer fluid to assist in the thermal management of a fuel cell. Water in the cathode exhaust is condensed at low temperature and is removed through a water separator. The water is use to for reforming fuel and heat exchange. The cathode exhaust is used in an expansion turbine (col. 17, lines 45-end.) It would be obvious to one of ordinary skill in the art at the time the invention was made to include a cathode exhaust cooler and water separator connected between the cathode chamber and the heat exchanger of Xu in order to accumulate water for the reforming process taught in both references. The skilled artesian would employ the excess water of Xu in order to reform a fuel source as taught in Cownden et al. (US 6,316,134.) The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Response to Arguments

Applicant's arguments filed 4/13/2006 have been fully considered but they are not persuasive.

With regard to the Xu reference, as applied, applicant argues that Xu does not teach “a heat exchanger coupled to the fuel cell for receiving waste heat of the fuel cell,” nor does Xu disclose that the “heat exchanger transfers heat energy from the fuel cell to the cathode exhaust gas flowing through the cathode exhaust gas line.” This is not persuasive. The anode fuel is taught in the reference to be heated to an elevated temperature (col. 5, lines 27-67 and col. 7, lines 1-20.) Further, the fuel cell reactions are well known to be exothermic and give off excess heat. The excess hydrogen from the anode exhaust is burned in a combustor with the cathode

exhaust and the resulting, heated, cathode exhaust, which is predominately oxygen, flows to the expander. The expander is coupled to the air compressor cathode source (col. 6, line 28 or the flow is used in a reforming process, (col. 6, lines 12-25.) Thus, the heat exchanger receives waste heat of the fuel cell and transfers heat energy from the fuel cell to the cathode exhaust gas flowing through the cathode exhaust gas line.

With regard to the Cownden reference, as applied, applicant argues that Cownden does not teach coupling heat from the fuel cell to add heat via a heat exchanger coupled for receipt of waste heat from the fuel cell. This is not persuasive. Cownden teaches a cathode oxidant exhaust stream that acts as a coolant fluid in several fuel cell system components (see col. 17, line 45 to col. 18, line 55.) In col. 18, line 13, the reference refers to the cathode exhaust stream as an indirect heat exchanger. The flow of the exhaust through the exhaust path coupled with the fuel cell forms a heat-exchanger. The flow is from the cathode and the flow is directed to a turbine (col. 18, line 37.)

For these reasons, applicant's arguments are not persuasive.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

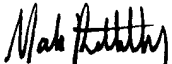
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

 7/3/2006
Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745